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because that change is more rapid in some localities than in others, but it is an interesting fact that this Calaveras skull is more thoroughly fossilized, a greater proportion of its phosphate of lime has become carbonate than in either of the European specimens which are reckoned of the greatest age.

We seem then fairly entitled to consider the Ancient Man of Calaveras the oldest representative of our race to which we can as yet refer; and being such, is he of a bestial type? Look for yourself. Figures have been published by Professor Whitney in his work. What is there bestial as shown by them? A single skull cannot, of course, speak for a whole race, but so far as this specimen can testify, what man is now, man was then. It manifests no sign of inferiority to the American race as now existing. Barbarous in habit he doubtless may have been. All the relics of workmanship thus far discovered of those coeval with him, indicate a low grade of civilization, and yet one not necessarily much, if at all, lower than that of most of the Indian tribes which formerly occupied the entire breadth of the continent. And in intellectual power, judging from his cerebral development, he might assuredly have claimed a fair average rank.

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THE GRAY RABBIT (LEPUS SYLVATICUS).

BY SAMUEL LOCKWOOD.

A BIT of odd, yet attractive innocence is the wild rabbit of Europe. I cannot say as much for its descendant, that piebald and lop-eared pet of my boyhood. All endearment died out at sight of the pampered old buck killing his own offspring from sheer wantonness; then came implacable dislike on seeing the doe eating one of her little babies. The domesticated rabbit gains nothing intellectually over its wild ancestor, but becomes emotionally unnatural, if not pathologically unsound. The tamed gray squirrel will lose the sexual instinct to the extent that it becomes degenerated into or absorbed by a morbid appetite so engrossing that the male will suck at one place on the tail of his mate, until he has nearly severed that member. Something not unlike is seen in the stallion of high strain, when biting the neck of the mare in the fervency of his passion. At the best, under domestication, the rabbit, like the guinea pig, *Cavia cobaia*, with its rabbit-like head and face, gets simply coddled into a

stupid harmlessness. In its wild state dwelling in communities, with a living to get, and many foes to shun, the wild rabbit has sharpened wits and many entertaining ways. I have seen them in their warrens abroad, and a rollicking abandon is their early morning frolic. Then all of a sudden comes a still, serious watchfulness, a oneness of circumspection, the whole camp mounting guard, for sitting on his hinder parts, every individual is on the alert. It is light and shade, Milesian merriment topping off with a bit of a row. Let one get its temper up, and it will stamp the ground in pettish, and it may be angry demonstration. All which has in it a spice of high-class nature; for I have seen chimpanzee do the same thing—yes, and coming higher, have painful recollections how a little motherless lad used to quail under a similar plantigrade terrorism, inflicted by Madam Anthropos. So this animal pantomime of “stamping out” is very human.

Though not without cunning, if a ferret invade its domicile, it is all up with bunny, sure. But a terrier dog has been known to squeeze itself into the burrow, and coney, returning to find his home invaded, has with great energy closed up the entrance, thus burying alive the disturber of his peace.

But all this is writing about real rabbits, which is not what we started to do. Perhaps the following occurrence may set our subject in a proper light: A friend had procured an Irish farm-hand at the immigrant depot, at Castle Garden, New York. He brought him to Keyport, New Jersey, by steamboat, then took him in his own vehicle to the farm, some five miles away. William was intelligent and made sensible remarks on the new scenes through which he was riding. Our farmer friend, an inveterate wag, said: “Yes, a fine country, William. But wait till I show you some of our native animals. You have not yet seen an American rabbit.” On reaching the first field of the farm a large Spanish stud appeared. Seeing his owner, Sancho approached the fence by the roadside, and brayed a sonorous welcome.

Farmer: “There, William, what do you think of that for an American rabbit?”

William: “An’ is that an American rabbit? Sure an’ if I’d seen the baste at home I would have pronounced him a jackass! But this *is* a fine country!”

It was not long before the man did make the acquaintance of

our gray rabbit, one which had been caught without harm in a trap. Attempting to toy with it, he received on his hand a smart blow from both hind feet of the affrighted little prisoner, which inflicted quite a scratch, on which he exclaimed: "Sure, Master, 'an is this why you called that ass an American rabbit? Troth, and the little baste does kick like a mule. But I should never take it for a rabbit. At home we would call it a young hare." Probably it would have bothered this sensible man, had he been told that there was in America a hare known as the "great jack-ass rabbit."

Still, William was right every time. The gray rabbit is a hare; and our opening paragraph is applicable only to the true European rabbit, *Lepus cuniculus*. The word rabbit then simply denotes a species of the genus *Lepus*, of which the word *hare* is the generic expression in the English and some of the continental languages. Though possessing several species of hare, America does not include the true rabbit. Passing by certain real distinctions of form, let us notice some striking differences of habit. The cony is a true burrower, and lives in communities. The hare is solitary and, as a rule, does not burrow, though sometimes found occupying an abandoned burrow of some other animal, like the so-called burrowing-owl, *Athene cunicularia*, which occupies the deserted burrows of the prairie dog, *Cynomys ludovicianus*. Then the rabbit, like the guinea pig, brings forth its little ones full-haired and open-eyed; but the young hare comes into being nearly naked and quite blind, altogether a very helpless thing. However, the popular voice has fairly got the start of science in this matter, and as the "gray rabbit" it will be always known. The truth is the systematists got things so badly mixed that not until recently did this very common animal have a scientific name of its own. Peter Kalm, the Swedish botanist, for whom Linne named our beautiful *Kalmia*, published at Stockholm his *Travels in North America*, 3 vols., 1753-61. Here is the earliest book allusion to the little hare, and it is referred to as inhabiting New Jersey. But the first carefully-worked-out diagnosis of the species, was made by John David Schoepf, who in 1783 wrote an accurate scientific description of it in New York, which he published the year following in Germany. What is strange and unfortunate, he did not give it a systematic name, but simply called it, "Der Nord-Americanische Haase;" and some of the system-

artists jumped at the conclusion that by "North American Hare," the savant meant *Lepus americanus*. It was some sixty years afterwards when Professor Baird translated Schoepf's description, and said in connection: "It is not a little remarkable, that this, one of the best known animals of North America, should not have received a distinct scientific name until 1837, when Dr. Bachman gave it the name *Lepus sylvaticus*," the wood hare. Other scientists had worked on the case, but, in fatal confusion, had mistaken the individual. Schreber, in 1792, named it *L. nana*, the dwarf hare, a good name, but his description applied to another hare. So it fell out that the only canonic christening the little fellow got, was received of Rev. John Bachman, a collaborator of Audubon. In what follows, the words hare and rabbit will be used interchangeably.

A curious appearance is sometimes noticeable upon the snow after it has lain a few days. The foot-tracks and hard fecal pellets of the rabbit are seen, and close by certain reddish-brown stains, like spots of oxydized blood. These, in mistake, I once explained as probably hæmorrhoids produced by constipation due to the dry fibrous food to which a severe winter reduces the animal, when succulent food cannot be got. This is not the true cause. Something similar is seen in winter when the bees of an apiary, after being snowed-in, are "dug out." The snow around the hives is immediately thickly spotted with small brownish orange stains, Bee keepers call it "bee dysentery." It is simply due to the cleanly habits of the insect. It will not defile the hive, so practices a severe continence until it can get out. In the hard winter of 1880, the hungry rabbits ventured into the gardens of Freehold, N. J., and in a number of places the snow was stained with these bloody spots. It is certainly interesting to know that all this comes of the almost fastidious cleanliness of the animal. Should it find no better shelter in the cold weather, it must occupy its "form," or "bed," that is, its squatting place, into which it pushes its back parts, then flattens itself like a toad in its hole. Thus squatted, such is the resemblance of color to the ground, that the hunter has strode close to the animal's nose and missed it. This form may be a depression in the side of the bank, or under a log, or in a tussock of grass, or in some low, bushy, close-leaved plant. Suppose a snow-storm, and the animal gets "snowed under," there is heat enough to make a little

chamber, and generally a thin breathing spot, or hole, above, caused by the thawing of the warm breath, which unhappily often betrays its hiding place to dog and man. If undisturbed, the animal is so impatient of cold as to stay in its form several days without food. So cleanly is the poor thing, that it will suffer acutely rather than pollute its home; hence the practice of a painful continence until forced by sheer distress to seek relief in a discharge of the suppressed urine. By this time the retained renal secretions have become thickened, and when discharged are of a reddish-brown hue.

The hare of Europe, it is commonly said, never gets fat, unlike other wild animals, even their rabbits, and this no matter how good may be its feeding grounds. Our wood hare does sometimes get quite fat, although it never makes "kidney fat." But confined to its form, as just described, the condition of the animal becomes extremely bad. From long fasting the flesh gets to be very lean, while the retention of the urine infects the entire tissues with urea, making its odor so rank as to receive the epithet "skunky."

The domestic rabbit can be made enormously fat. An epicure not many miles away, often luxuriated on a buck of large size, splendid condition and exquisite flavor. The truth told, it was an eunuch Cuniculus, fat, fair and portly, which graced our gourmand's board. But before leaving the adipose part of this subject, a bit of ignorance must be mentioned, which ought to be unique. Last autumn my neighbor's man captured a fine, gray rabbit. He had skinned the game, and was profuse in praise of its condition; but having opened it, the poor man stood aghast in horror, and was suddenly taken sick, for he beheld in the coney an immense tape-worm! And this horror fell upon the whole family, for they all "saw it with their own eyes." So, not to waste the thing, it was thrown into the sty out of sight. Here was a pearl cast before swine, for the simple fact was, that attached by the edge of a thin membrane to the viscera, along nearly its entire length, was a ribbon of adipose tissue, which was scalloped by little beads of fat. These scallopings were mistaken for "tape-worm joints." In truth, this white, wavy fillet of round, waxen beads was really a very pretty object. Besides, who would look for a *Tænia* on the outside of the alimentary canal? However, these innocents believed they were right, and

"guessed," dear souls, that "the naturalist wasn't nice enough about his victuals."

Our gray rabbit is often badly tormented with worms, or worm-holes, in the skin, like the warbles of cattle. These are really subcutaneous bots, due to the presence, under the pelt, of the larvæ of *Cuterebra cuniculi* Clark. Packard speaks of this species of fly infesting rabbits in the South, but they have long been too common in New Jersey. Over the pit occupied by each grub or maggot, is a clean-cut hole through the skin, which serves the larva for a breathing place. They are the most noticeable in the early fall, when the animal is in its best condition; for as the grub or larva feeds on the juices of its host, the mother-fly does not deposit her eggs upon the "ill-favored and lean-fleshed." I am told, however, of a boy who caught a rabbit in the winter, and took it to a friend of mine to skin, and it was too badly infested to be usable. Professor C. V. Riley writes me thus: "I have received the larva of *Cuterebra cuniculi* as early as July 19th. The larvæ were at that time full grown, and pupated four days later. I have also found them, both large and small, as late as September, so there is probably but little uniformity in their development, and it is not particularly strange that they should be found in the larval state in the winter." The hunters say: "The grub leaves after frost." The places specially infested on the animal, are the back and neck, and forward parts of the shoulders. So bad is this at times that a suppuration occurs under the pelt, and an attempt to flay the animal starts the pus flowing, and the loathsome cadaver is cast away. Nor is this flow of maturation to be taken for the effect of wounding the larva by the knife. The skillful dresser of such small game scarcely uses the knife in skinning, except at the head and toes, drawing the pelt off like a stocking.

But the hare family is often the subject of an epidemic. In his grand monograph on the Leporidae, says J. A. Allen: "In the case of our little wood hare (*L. sylvaticus*), I have repeatedly met with their dead bodies in the woods and thickets, bearing no marks of a violent death, and have noted the scarcity of these animals during the years immediately following." The Indians declare that the hares as a food supply are sometimes seriously reduced by disease. Mr. Allen cites Dr. J. G. Cooper in AMERICAN NATURALIST, who although as against the Indian averment,

and disposed to attribute much of this mortality to the deep snows making them easy prey, says of a certain species : " Their numbers seem never to have increased much, north of the Columbia and Snake rivers since the epidemic (small pox) destroyed them some years since ; but south of these rivers they became common." O, shade of Jenner ! *Lepus variolus* ! What says the epicure to this variety ?

The gray rabbit has one form or bed to which it adheres with a cat-like attachment, the runway to which may sometimes be easily traced. If the gunner stations himself near this the game retreating homeward becomes an easy prey. A hunter told me when praising his hound, that by its bark he has distinguished the doubling at half a mile distant, and shot the rabbit at its return ; but that an old rabbit, if you miss him, will avoid his " bed," and give you trouble to get him. An old rabbit usually has a series of forms at distances of thirty or forty yards from its favorite one. These supplemental forms it uses for comfort's sake, and for strategic purposes. It dislikes to face the wind, and when in repose keeps its back to windward. With the change of wind, it will change its form. A change may be made upon suspicion of danger ; or it may be circumvented when away from its favorite form. Though if the danger be imminent, it usually has some hole in the ground or place under or behind a log, or in a brush-heap, into which it at once retreats. If not taken too suddenly, there is a good deal of intelligence in its methods of flight, as well as in its temporary change of domicile. They do not connect their forms by their tracks, but take prodigious leaps, clearing at a bound from fifteen to twenty feet, and the zig-zags and doublings are well suited to deceive. A curious fact about their tracks might delude the unwary into the belief that they were double, and directed backwards. The hare is virtually a plantigrade, and its leaping is done with its hind legs, much like that of the kangaroo. Upon the soft snow or on the soft ground the spoor, or trail, of a rabbit in full jump comprises two dissimilar pairs of imprints ; a pair of small toe-tracks inside, and a pair of large full foot-tracks outside. The series is the impression of successive leaps, which are made in the following way : The two little front feet or hands are put pretty close together, while the hind feet are set somewhat widely apart. The fore feet are then raised from the ground, and the body by the

same act is thrown back so as to bring the entire weight upon the firmly planted hind feet, in which, and in the thighs, and on the back the muscles are powerful, hence comes the tremendous spring. In alighting, the forward feet nearly close together, touch the ground first; then come down the hinder feet, striking outside and forward of the front feet. Thus is made a double track, the large and wide one outside and forward of the small one, like the kangaroo's track, with this singular difference, the latter makes his double tracks walking, for when leaping the fore feet do not touch the ground. These peculiarities of rabbit tracks were noticed by that delightful naturalist, Robert Kennicott, in 1857, who adds: "In making the longest leaps the fore feet strike in a line, one behind the other, and at some distance in the rear of the hind ones, as if they had been again raised before the latter had touched the surface." It is noticeable that when in quest of food on the snow, their tracks are made of leaps about four feet long.

The strategic tact and knowingness of the wild rabbit was well understood by the plantation negroes, who held the little fellow in an affection not less than that of the Feejee for fat missionary. The upper side of the rabbit's tail is brown, but it has a persistence in showing the under side, which is like a toilet puff, cottony white. The tail being ordinarily carried erect, looks like a tuft of pure clean cotton, or a fresh opened cotton ball, hence its familiar name among the negroes—"little cotton tail." Uncle Remus, though partial, always gets fraternal when on this subject, and makes the cunning "brer rabbit" circumvent the slyness of "brer fox."

(To be continued.)

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THE CRUSTACEAN NEBALIA AND ITS FOSSIL ALLIES, REPRESENTING THE ORDER PHYLLOCARIDA.

BY A. S. PACKARD, JR.

I.—THE STRUCTURE AND DEVELOPMENT OF NEBALIA.

A GOOD deal of interest is attached to this little Crustacean, on account of its composite nature and its evident relationship to some curious fossils which are usually placed among the Phyllopods. The following exposition of the structure of *Nebalia bipes*, which is sometimes dredged on our coast, and the remarks on its fossil allies may prove to be of interest to our